Statement for the Record

The Honorable Dr. Tara O'Toole

Under Secretary, Science and Technology Directorate

Department of Homeland Security

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Introduction

Good afternoon, Chairwoman Clark, Congressman Lungren, and distinguished Members of the Subcommittee. I am honored to appear before you today on behalf of the Department of Homeland Security (DHS) to report on my plans for strengthening the Science and Technology Directorate's (S&T) efforts to advance the scientific and analytical foundations and deliver the robust technological solutions needed to protect the nation from natural disasters and terrorist threats.

Since I was confirmed as Under Secretary for S&T in November, I have been continuously impressed with the breadth and reach of S&T's activities, which reflect the tremendous scope and variety of the Department's missions. S&T serves as the main source of scientific and technological research and development for DHS operating components and has a special obligation to provide knowledge and technologies needed by the nation's first responders. The Directorate is also charged with assessing and testing homeland security vulnerabilities and possible threats as well as with directing, funding, conducting, and establishing priorities for national research, development, testing and evaluation of technologies related to the DHS missions.

S&T must address a dynamic spectrum of threats and vulnerabilities across the homeland security enterprise and deliver cost-effective operational and technological solutions to meet a wide array of operational requirements. The S&T mission also requires a robust, rigorous and disciplined research and development effort to expand our understanding of homeland security challenges, create advanced technologies and develop new ways of thinking about problems and potential solutions.

All of this work should be considered in the context of the newly completed Quadrennial Homeland Security Review (QHSR). The QHSR articulates the homeland security vision and frames the key mission areas encompassed by the DHS components and the greater homeland security enterprise that includes state, local and tribal governments as well as the private sector, universities, and individuals. There are five homeland security missions. These are:

1. Preventing Terrorism and Enhancing Security
2. Securing and Managing Our Borders
3. Enforcing and Administering Our Immigration Laws
4. Safeguarding and Securing Cyberspace
5. Ensuring Resilience to Disasters

DHS Missions

S&T carries out many types of activities and services in pursuit of each of the Department's missions. The Directorate's most obvious work involves developing new technologies and shaping existing technology solutions to fit the operational needs of the enterprise.

S&T is also in the business of creating new knowledge, through sponsorship of basic research, university programs, sustained analyses of technical problems and the construction of research roadmaps, which identify critical information gaps. A particularly important S&T role is the oversight of technology testing and evaluation (T&E). T&E is an essential element of a disciplined acquisition process, and I expect our role to grow in importance. The Directorate also frequently serves as technical consultant to DHS operational components. Further, S&T staff work to stay abreast of and to leverage the extensive R&D work being undertaken by other government agencies, universities and private sector organizations, large and small, in the United States and overseas.

The following are a few examples of the different kinds of work S&T is doing to support key DHS missions.

Mission 1: Preventing Terrorism and Enhancing Security

Aviation Security

- S&T is collaborating with the Transportation Security Administration (TSA) to improve advanced imaging technology (AIT) to reliably detect passenger-borne threats. A current focus of this long-standing work is on developing software algorithms that could improve contraband detection and reduce both false alarm rates and privacy concerns. Basic standards for this technology have been developed by S&T, and we will leverage this investment to ensure future systems perform as required.
- The Transportation Security Laboratory (TSL) in Atlantic City is expanding its traditional focus on aviation security to address explosive threats to mass transportation. Research there will produce emerging technologies for screening people and identifying improvised explosive devices in mass transit environments.
- TSA is testing software produced at the University Centers of Excellence (COE) to randomize airport searches and checkpoints in order to thwart terrorists' surveillance and attacks.

Protect Critical Infrastructure

- S&T is developing extremely strong and resilient materials, design procedures, and construction methods that help prevent building collapse due to explosion. Three Small Business Innovative Research (SBIR) awards are also aimed at developing such novel materials. These include nano-enabled spray-on foams; three-dimensional woven textiles; and materials with internal geometric structure, known as microtrusses.

Mission 2: Securing and Managing our Borders

Detecting Semi-Submersibles

- Small, self-propelled, semi-submersible boats are carrying illegal drugs and other illicit cargo from South America destined for United States through the transit zone in the

Eastern Pacific, an issue that poses a serious emerging threat to homeland security. S&T leads a team of 25 different organizations conducting international field experiments designed to assess current capability and identify shortfalls for detecting, tracking, and interdicting these vessels.

Detecting and Monitoring Tunnels

Clandestine cross-border and public infrastructure drainage tunnels are being used as conduits for illegal immigration and smuggling activities. S&T is developing and assessing sensors and surveillance technologies to detect clandestine tunnels and monitor human activity in our subterranean infrastructure.

Mission 3: Enforcing and Administering Immigration Laws

Multiple Biometrics

- S&T is working to address DHS components' growing requirements for biometric data. Over the next five years, DHS's biometrics databases (maintained by US-VISIT, U.S. Customs Border Protection, and others) will grow from systems with data relating to 100 million persons to 500 million persons. S&T is partnering with industry and academia to develop the capability to collect two or more types of biometric data per individual, including fingerprint, face image, and iris recognition. Combining multiple biometric data points will expedite legitimate entry into the United States, enable DHS to search and share biometric data with other agencies, and help to prevent spoof attempts against any one biometric. S&T has funded standards for biometric data formats, quality of images, and exchange of data that are helping US-VISIT work with other U.S. government and law enforcement agencies.

Kinship Identification

- To help U.S. Customs and Immigration Services (USCIS) verify citizenship eligibility, S&T is developing a rapid and inexpensive DNA-based kinship test. This development will help USCIS process immigration requests faster and reduce fraudulent applications.

Mission 4: Safeguarding and Securing Cyberspace

Inherently Secure Systems

- In cybersecurity, most existing solutions involve "patching" an unsecure system. S&T is working to make future cyber systems inherently more secure. Our recently published "Roadmap for Cybersecurity Research" sets a path forward to meet this goal. This work supports the current White House Comprehensive National Cybersecurity Initiative (CNCI) and was drafted to be especially useful for private industry, enabling companies to proactively develop solutions to identified problems.

Domain Name Security

- S&T continues to partner with the DHS National Protection and Programs Directorate**,** the Office of Management and Budget, the White House Office of Science and Technology Policy, the National Institute of Standards and Technology, and the global

Internet community to deploy Domain Name System Security Extensions (DNSSEC) onto government and private sector networks. Deployment of this protocol will ensure that when an Internet user thinks, for example, they're going to *mybank.com*, they don't end up at a facsimilie site at *hackers.net*.

Mission 5: Ensuring Resilience to Disasters

Recovery from Bioterror Attacks

- S&T is participating in and leading several initiatives that address post-attack environmental event characterization sampling strategies, decision frameworks, and associated concepts of operation. The goal is to formulate a systems approach to restoration focused on reducing time and cost while ensuring the safety of urban areas after bioattacks.

Vaccines Against Foot and Mouth Disease

- Plum Island Animal Disease Center is developing vaccines and medicines for high-priority Foreign Animal Disease pathogens that will differentiate infected animals from those who are vaccinated. One of our COEs, run by Texas A&M University and Kansas State University, is conducting related basic research on vaccines and disease detection.

Earthquake Warning Systems

- S&T is working with the Department of Energy (DOE) National Labs and private industry to develop seismic warning models that integrate overhead sensor data into emergency management tools to better predict and plan for earthquakes.

Unifying and Maturing DHS

In addition to these five explicit mission areas, the QHSR identifies a sixth focus area designed to unify and mature DHS as an organization. The following are examples of S&T activities related to this sixth mission.

Consolidation of DHS Research Activities – Domestic Nuclear Detection Office

As part of unifying and maturing the Homeland Security Enterprise, the FY 2011 Budget proposes to transfer the $109 million radiological and nuclear transformational and applied research portfolio from the Domestic Nuclear Detection Office (DNDO) into S&T. Consolidating all DHS fundamental research in one component allows efficiencies and will help eliminate gaps, better enable cross-cutting research and more easily leverage economies of scale.

During the integration, S&T and DNDO will conduct in-depth reviews of ongoing work to identify the strongest programs for advancement. This will help ensure our focus on the most promising and highest priority research areas. The new Radiological and Nuclear Division in S&T will identify research and develop technologies, processes and procedures to dramatically

improve the performance of nuclear detection components and systems; significantly reduce the operational burden of the radiological/nuclear detection mission; and improve the nation's capability to respond to and recover from radiological/nuclear attacks.

Building the National Bio and Agro-Defense Facility (NBAF)

The safety and security of our food supplies are critical to national defense; another aspect of maturing and building S&T's capabilities will be the continuation of our efforts to build the National Bio and Agro-Defense Facility (NBAF). NBAF will be the nation's first integrated agricultural, zoonotic disease, and public health research, development, testing, and evaluation facility. NBAF will be able to address threats posed by high-consequence zoonotic diseases and foreign animal diseases, such as Foot and Mouth Disease. NBAF will also have a bio-safety level 4 capability, allowing S&T to perform more extensive research on a wider array of some of the most dangerous diseases than our current laboratories allow.

DHS is committed to building a state-of-the-art facility that incorporates all necessary safeguards, both facility-based and procedural, to ensure its safe and secure operation. DHS is completing a comprehensive site-specific risk assessment to develop mitigation strategies and establish the protocols necessary for safe operation. S&T has also contracted with the National Academy of Sciences to perform an independent review of our risk assessment and mitigation plans. NBAF construction will not begin until that review is complete and shared with Congress.

University Centers of Excellence

S&T will continue to invest in and mature our University Programs and COEs. These efforts harness and leverage the cutting edge research of our Universities and create engines of innovation. DHS internships, fellowships, and scholarship programs, such as the Scientific Leadership Awards, help ensure that the necessary Science, Technology, Engineering and Math graduates are available to help lead the Homeland Security Enterprise into the future.

In order to ensure the development of a science and technology workforce that reflects the diversity of the American people, we continue to grow our outreach to Minority Serving Institutions (MSI). During the past two years, we've sharply increased the number of new MSI Scientific Leadership Awards while modifying the program to better reflect the composition of the MSI community by adding categories for institutions focused on Associate's and Bachelor's degree programs. S&T has increased funding by increasing the number of Scientific Leadership Awards and by naming four MSIs to serve as co-lead institutions for COEs.

COE collaborations have made substantial progress and continue to broaden their impact and demonstrate their value in a variety of ways. S&T investment in COEs has attracted the attention of outside funders and resulted in 178 requests for support from other government agencies in FY 2009. These requests, and the 126 additional requests from DHS components, resulted in more than $56 million dollars of additional funding in FY 2009, more than doubling

the original S&T investment. This ability to leverage the initial investment into outside funding demonstrates the value of their work.

S&T Directorate: Moving Forward

S&T has begun a strategic planning process that I intend to be inclusive and ongoing. I appreciate the observations and suggestions that we have received from Congressional members and staff, and we will continue to solicit input on how S&T might better serve the Department, the broader Homeland Security Enterprise, and the nation. The strategic planning process is not finished, but some strategic priorities are already clear.

Capstone Integrated Product Team (IPT) Process

My predecessor performed an important service in establishing the Capstone Integrated Product Teams (IPTs), which created an explicit way to link the technology needs of DHS' operational components and first responders to S&T's technology development efforts. I intend to build on the customer relationship that S&T has with the operating components and first responders, largely enabled by the Capstone IPT process, and to evolve that relationship into an increasingly collaborative partnership. I would also like to embed more rigor and consistency in the processes used by the IPTs to identify capability gaps and technology development priorities.

First Responder Engagement

S&T recognizes the importance of the first responder community. They are the federal, state, local, tribal and territorial emergency professionals who prevent, defend against, and mitigate the consequences of terrorist attacks and natural disasters. First responders are a widely diverse group with vastly different needs, resources and requirements. For example, despite their shared core mission, firefighters in New York City face very different challenges on a day-to-day basis than their counterparts in Muscatine, Iowa. The diverse range of environments in which responders across the country operate creates several challenges to supporting this essential component of the homeland security enterprise.

One way to address this challenge is to expand S&T's engagement with first responders beyond traditional technology development and place more focus on the delivery of information products for use across a broader spectrum of the first responder community. While every first responder may not have the budget to buy emerging technology, nearly all can gain access to the Internet to download test reports and other important information on currently available commercial equipment. S&T has established the System Assessment and Validation for Emergency Responder (SAVER) Program within its Test & Evaluation and Standards Division to conduct objective assessments of commercial responder equipment and to provide those results along with other relevant equipment information to the emergency response community. The SAVER Program provides information that enables decision-makers and responders to better select, procure, use and maintain emergency responder equipment.

S&T also seeks to leverage its testing and standards efforts to vertically integrate products for responders by developing and posting online standard operating procedures for incidents, identifying equipment that has been tested and would work well for those procedures, and posting training and certification plans to enable the responder community to more easily integrate it into operational use. While these efforts may not generate the same level of enthusiasm as a new technology would, they can be applied across a much broader swath of the community and could help standardize the response to certain incidents. In the end, this approach potentially could have a bigger operational impact than efforts to develop technologies with more limited use.

Acquisition Support

DHS recently implemented Acquisition Directive 102-01, which institutionalizes a disciplined process for DHS technology acquisitions. The directive mandates detailed specification of operational requirements and the conduct of rigorous developmental and operational testing. Implementation of this directive is an important milestone in the maturation of DHS and should promote a more transparent and cost-effective approach to technology development and deployment across the Department.

A key role of S&T at this point in the Department's evolution is to oversee testing and evaluation of complex technologies that the DHS components are seeking to acquire. DHS intends to leverage the private sector's own research investments in commercial technology against the mission needs of the Department, but we must exercise appropriate diligence to determine if the technologies work as anticipated in realistic operational settings. Secretary Napolitano has instructed me to work closely with the DHS Under Secretary for Management and DHS components to ensure that the new Acquisition Directive is implemented in a manner that encourages a more mature approach to technology investments.

Test and Evaluation

Section 302 of the Homeland Security Act of 2002 charges S&T with the responsibility for "coordinating and integrating all research, development, demonstration, testing, and evaluation activities of the Department." To carry out these and other test and evaluation (T&E)-related legislative mandates, the Directorate established the Test and Evaluation and Standards Division (TSD) in 2006 and created the position of Director of Operational Test & Evaluation in 2008.

TSD develops and implements robust Department-wide T&E policies and procedures. Working with the DHS Under Secretary for Management, TSD approves Test and Evaluation Master Plans that describe the necessary Developmental Test and Evaluation and Operational Test and Evaluation tasks that must be conducted in order to determine system technical performance

and operational effectiveness based upon vetted Operational Requirements Documents. The Department's new Acquisition Directive provides the management framework for a robust and comprehensive T&E program.

Leveraging Work of Interagency and International Partners

In many cases, the challenges faced by the homeland security enterprise are shared by others, and DHS can leverage the work of our interagency, international and commercial partners to provide the best value for our investments. By leveraging others' science and technology capabilities, S&T can ensure the best products and information are available sooner and at a reduced cost to the U.S. government.

DHS and the Department of Defense (DOD) in particular share many technical challenges, such as detecting and finding adversaries, locating improvised explosive devices and protecting cyber networks. DOD has a robust research and development infrastructure to address these challenges, and S&T has developed a strong formal partnership with them through the Capability Development Working Group (CDWG). The CDWG is chaired by the DHS S&T Under Secretary, the DHS Under Secretary for Management, and the DOD Under Secretary for Acquisition, Technology & Logistics. The partnership: ensures the best use of resources and avoids duplication of effort; explores capability development topics of mutual interest and decides on implementation paths; promotes future cooperation; and supports and informs policy, planning, and decision-making.

A focus on aviation security has led S&T to further enhance its partnerships with international groups as well as DOE. Following the failed Dec. 25 bombing attempt, we established the DHS–DOE Aviation Security Enhancement Partnership to develop technical solutions key to aviation security problems. This Under Secretary-level governance mechanism will manage a strategy to further extend and leverage this relationship, with a focus on improving aviation security. This strategy will:

- deliver key advanced aviation security technologies and knowledge;
- conduct analyses to assess possible vulnerabilities and threats and support/inform technology requirements, policy, planning, and decision-making activities; and
- review the use of existing aviation security technologies and screening procedures, and the impact of new or improved technologies using a systems analysis approach to illuminate gaps, opportunities and cost effective investments.

Working with the Private Sector and Small Business

In 2008, S&T officially established the Commercialization Office to develop and execute programs and processes that identify, evaluate and leverage the products and capabilities of the commercial sector. Through the System Efficacy through Commercialization, Utilization, Relevance and Evaluation (SECURE™) Program, an innovative public-private partnership, DHS harnesses the skills, expertise, and resources of industry to develop products and services that

align to DHS operational requirements with minimal investment of taxpayer dollars. The program identifies operational requirements as well as the commercial market potential available to businesses if they develop a product that fulfills those requirements. The program provides an entrée, especially for small businesses, into the marketplace of government equipment and attempts to leverage the internal research and development dollars of industry to solve DHS requirements.

As the 2009 report on The Small Business Economy points out, small businesses are "more likely to develop emerging technologies" than large ones. It is critical for S&T to leverage these innovators for the good of the homeland security enterprise. So far, S&T and DNDO have made 372 Phase I and 122 Phase II awards, totaling $139 million, to small businesses through the SBIR program. Through FY09, we have received 2,300 applications from all 50 states. In order to make sure we are getting the best and most innovative ideas the country has to offer, it is critical that we continue our efforts to reach new small and rural businesses.

Conclusion

I appreciate this opportunity to appear before you today and report on S&T activities relevant to the scope of this Subcommittee and outline my plans for aligning the Directorate to the Department's priorities as articulated in the QHSR.

I am pleased to have the opportunity to strategically guide the Directorate as it advances its efforts to respond to the current threat environment and enable technological capabilities to better protect the American people. Thank you for your time. I look forward to your questions.